

SEQUENCE LISTING

SEQ ID NO: 1: Nucleotide sequence of 11.5 kb PCR product amplified from chromosomal DNA of *C. jejuni* OH4384 which includes *LOS* biosynthesis locus

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1 aaagaatacgc aatttgctaa agagggtttta aatcttagtg gtattgatga aacacatata
61 gaattagcgc caaaatttaa tcttgaagag ctaatggctt ttacaaaaat gatggatctt
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181 acgatttttg gtgcaacacc aagctaccgc aatgcttttc aaactcatat caataaaatc
241 attgatacag gtaaaaaaat ccaaaatgcc aagcatatcg ataaaagtga tttttgtatc
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361 tgatagaata tatcttagtc ttattatat ttgaaattt ttgttactt ttatgcctga
421 ttgtatcttg catttttttag ctttgattgt agcaagaatc gtttttcac ttaacaaaaa
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SEQ ID NO: 1 (cont'd)

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SEQ ID NO: 1 (cont'd)

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 3901 acaaaaactt ctttatgata ttggaaatt ttggcaaaa ataaaaata tttaataata
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7201 ttaagaata cacagaaaa ttaggctctg ttatcttag cacacctttt tctcgtgcag
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 7501 acgctatgct tgaattaaaa aaagaatttt cttgtatggt aggttaagc gaccacacaa
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SEQ ID NO: 1 (cont'd)

11221 accatattta aactattatc ttacttttta tcatcgataa tcaaaatttc aatatctttt
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11341 gggattatga tagaaagttag ggcatattt ttctaaatt ttgttaaaat aataaaaaaca
11401 attctatcaa agtttaggaa atttatgaa attttttatc acctccaac ctggttaggc
11461 gatacggtaa tggc

SEQ ID NO: 2: Nucleotide sequence that encodes bifunctional sialyltransferase *cstII* from *C. jejuni* strain OH4384 (ORF 7a of *LOS* biosynthesis locus)

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGT	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATGCAAGGC	AGTATTTTAC	150
AATCCTATTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAGAA	CTTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTCAA	CAACTTAAAG	ATTTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTTCAA	TCAAAGAATT	ACCTCAGGGG	400
TTTATATGTG	TGCAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATACTAA	500
ACAAAAAAT	CTTTTAAAAT	TGGCTCCTAA	TTTTAAAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAACTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAACTACACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750
TATGGAAAAT	TTTCAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 3: Amino acid sequence of bifunctional sialyltransferase *CstII* from *C. jejuni* strain OH4384 (encoded by ORF 7a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C NQFYFEDKYY	LGKKCKAVFY
51	NPILFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFFK	QLKDFNAYFK	FHEIYFNQRI	TSGVYMCABA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHVFKG	K

SEQ ID NO: 4: Nucleotide sequence of bifunctional sialyltransferase-encoding *cstII* (ORF7a) from *LOS* biosynthesis locus of *C. jejuni* serotype O:10

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
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ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATTCAAAGC	AGTATTTTAC	150
AATCCTGGTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAGAA	CTTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTAAA	CAACTTAAAG	AATTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATCTCAA	TCAAAGAATT	ACCTCAGGAG	400
TCTATATGTG	TGCAGTAGCT	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCTGGAATTG	ATTTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATAACCA	500
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GAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAACTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAACTACACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750

TATGGAAAAT	TTTCAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATTA	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 5. Amino acid sequence of bifunctional sialyltransferase *cstII* encoded by ORF 7a of *LOS* biosynthesis locus from *C. jejuni* serotype O:10

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C NQFYFEDKYY	LGKKFKAVFY
51	NPGLFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYLNQRI	TSGVYMCABA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQEN	LLKLAPDFKN	DRSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 6. Nucleotide sequence of *C. jejuni* serotype O:41 *cstII* coding region

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGC	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATGCAAAGC	AGTATTTTAC	150
AATCCTAGTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATCAT	GTGTTCTAAT	TTTAACCAAG	250
CTCATCTAGA	AAATCAAAAT	TTTGTAAAAA	CTTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTCAA	CAACTTAAAG	AATTCAATGC	350
TTATTTTAA	TTTCACGAAA	TTTATTTCAA	TCAAAGAATT	ACCTCAGGGG	400
TCTATATGTG	CACAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTATATCA	AAATGGATCA	TCTTATGCTT	TTGATACCAA	500
ACAAAAAAAT	CTTTTAAAT	TGGCTCCTAA	TTTTAAAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACGAAATAAA	GCTATATTGT	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAAGTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAAGTATACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750
TATGGAAAAT	TTACAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATTA	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 7. Amino acid sequence of *CstII* from *C. jejuni* serotype O:41

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C NQFYFEDKYY	LGKKCKAVFY
51	NPSLFFEQYY	TLKHLIQNQE	YETELIMCSN	FNQAHLENQN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYFNQRI	TSGVYMCTVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL
201	EKTYEIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFTKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 8. Nucleotide sequence of coding region for *CstII* from *C. jejuni* O:19.

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1  atgaaaaaag ttattattgc tggaaatgga ccaagtttaa aagaaattga
51 ttattcaagg ctaccaaagt attttgatgt atttagatgt aatcaatttt
101 attttgaaga taaatactat cttggtaaaa aatgcaaagc agtggttttac
151 acccctaatt tcttctttga gcaatactac actttaaaac atttaatcca
201 aaatcaagaa tatgagaccg aactaattat gtgttcta at tacaaccaag
251 ctcatctaga aaatgaaaat tttgtaaaaa ctttttacga ttattttcct
301 gatgctcatt tgggatatga tttttttaaa caacttaaag aatttaaatgc
351 ttatttttaa tttcacgaaa tttatttcaa tcaaagaatt acctcagggg
401 tctatatgtg tgcagtagcc atagccctag gatacaaaga aatttatcct
451 tcgggaattg atttttatca aaatgggtca tcttatgctt ttgataccaa
501 acaagaaaat ctttttaaaac tagcccctga ttttaaaaat gatcgctcgc
551 actatatcgg acatagtaaa aatacagata taaaagcttt agaatttcta
601 gaaaaaactt acaaaaataaa actatattgc ttatgtccta atagtccttt
651 agcaaatttt atagaactag cgccaaattt aaattcaa at tttatcatac
701 aagaaaaaaa taactacact aaagatatat tcataccttc tagtgaggct
751 tatggaaaat tttcaaaaaa tattaatttt aaaaaataa aaattaaaga
801 aaatgtttat tacaagtga taaaagatct attaagatta ctagtgata
851 taaagcatta tttcaaagga aaataa

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SEQ ID NO: 9. Amino acid sequence of *CstII* from *C. jejuni* O:19.

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1  MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKAVFY
51  TPNFFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLNEN FVKTFYDYFP
101 DAHLGYDFFK QLKEFNAYFK FHEIYFNQRI TSGVYMCVA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQEN LLKLAPDFKN DRSHYIGHSK NTDIKALEFL
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSA
251 YGKFSKNINF KIKIKENYV YKLIKDLLRL PSDIKHYFKG K

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SEQ ID NO: 10. Amino acid sequence of *CstII* from *C. jejuni* strain NCTC 11168

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          10          20          30          40          50
1  MSMNINALVC GNGPSLKNID YKRLPKQFDV FRCNQFYFED RYFVGKDVKY
51 VFFNPVFVFE QYYTSKKLIQ NEEYNIENIV CSTINLEYID GFQFVDNFEL
101 YFSDAFLGHE IIKKLKDFFA YIKYNEIYNR QRITSGVYMC ATAVALGYKS
151 IYISGIDFYQ DTNNLYAFDN NKNLLNKCT GFKNQKFKFI NHSMACDLQA
201 LDYLMKRYDV NIYSLNSDEY FKLAPDIGSD FVLSKKPKKY INDILIPDKY
251 AQERYYGKKS RLKENLHYKL IKDLIRLPSD IKHYLKEKYA NKNR

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SEQ. ID NO: 11. Nucleotide sequence for coding region for *Cst II* from *C. jejuni* O:4

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1  ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATTCAAGG
61  CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
121 CTTGGTAAAA AATGCAAAGC AGTGTTTTAC ACCCCTGGTT TCTTCTTGA GCAATACTAC
181 ACTTTAAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
241 TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT
301 GATGCTCATT TGGGATATGA TTTTTTAA CAACTTAAAG AATTAAATGC TTATTTTAAA
361 TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
421 ATAGCCCTAG GATACAAAGA AATTTATCTT TCGGGAATTG ATTTTATCA AAATGGGTCA
481 TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTAAAAC TAGCCCCTGA TTTTAAAAAT
541 GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAGCTTT AGAATTCTA

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601 GAAAAAACTT ACAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTTT AGCAAATTTT
661 ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT
721 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT
781 AAAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA
841 CCTAGTGATA TAAAGCATT TTTCAAAGGA AAA

SEQ ID NO: 12. Amino acid sequence of Cst II from *C. jejuni* 0:4

MKKVIIAGNG PSLKEIDYSR LPNDFDVFR NQFYFEDKYY LGKKCKAVFY TPGFFFEQY
YTLKHLIQNQ EYETELIMCS NYNQAHLNE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY
FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD
FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK
NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 13. Nucleotide sequence for coding region for Cst II from *C. jejuni* 0:36

ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATCAAGG
CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
CTTGGTAAAA AATGCAAAAC AGTGTTTTAC ACCCCTAATT TCTTCTTTGA GCAATACTAC
ACTTTAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
TACAACCAAG CTCATCTAGA AAATGAAAT TTTGTAAAAA CTTTTTACGA TTTTTTCTT
GATGCTCATT TGGGATATGA TTTTTTTAAA CAACTTAAAG AATTTAATGC TTATTTTAAA
TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
ATAGCCCTAG GATACAAAGA AATTTATCTT TCGGGAATTG ATTTTATCA AAATGGGTCA
TCTTATGCTT TTGATACCAA ACAAGAAAAA CTTTTAAAAC TAGCCCTGA TTTTAAAAAT
GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA
GAAAAAACTT ACAAATAAA ACTATATTGC TTATGTCCTA ATAGTCTTTT AGCAAATTTT
ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT
AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT
AAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA
CCTAGTGATA TAAAGCATT TTTCAAAGGA AAA

SEQ ID NO: 14. Amino acid sequence of Cst II from *C. jejuni* 0:36.

MKKVIIAGNG PSLKEIDYSR LPNDFDVFR NQFYFEDKYY LGKKCKTVFY TPNFFFEQY
YTLKHLIQNQ EYETELIMCS NYNQAHLNE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY
FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD
FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK
NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 15. Nucleotide sequence of glycosyltransferase-encoding ORF 4a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGAAGAAAA TAGGTGTAGT TATACCAATC TATAATGTAG AAAAATATTT 50
AAGAGAATGT TTAGATAGCG TTATCAATCA AACTTATACT AACTTAGAAA 100
TCATACTTGT CAATGATGGT AGCACAGATG AACACTCACT CAATATTGCA 150
AAAGAATATA CCTTAAAAGA TAAAAGAATA ACTCTTTTTG ATAAGAAAAA 200
TGGGGGTTTA AGTTCAGCTA GAAATATAGG TATAGAATAC TTTAGCGGGG 250
AATATAAATT AAAAAACAAA ACTCAACATA TAAAAGAAAA TTCTTTAATA 300
GAATTTCAAT TGGATGGTAA TAATCCTTAT AATATATATA AAGCATATAA 350
AAGCTCTCAA GCTTTTAATA ATGAAAAGA TTTAACCAAT TTTACTTACC 400
CTAGTATAGA TTATATTATA TTCTTAGATA GTGATAATTA TTGGAAACTA 450
AACTGCATAG AAGAATGCGT TATAAGAATG AAAAAATGTGG ATGTATTGTG 500
GTTTGACCAT GATTGCACCT ATGAAGACAA TATAAAAAAT AAGCACAAAA 550
AAACAAGGAT GGAAATTTTT GATTTTAAAA AAGAATGTAT AATCACTCCA 600

AAAGAATATG	CAAATCGAGC	ATTAAGTGTA	GGATCTAGAG	ATATTTCTTT	650
TGGATGGAAT	GGAATGATTG	ATTTTAATTT	TTTAAAGCAA	ATTAAACTTA	700
AATTTATAAA	TTTATTATC	AATGAAGATA	TACACTTTGG	GATAATTTTG	750
TTTGCTAGTG	CTAATAAAAT	TTATGTTTTA	TCACAAAAGT	TGTATTTGTG	800
TCGTTTAAGA	GCAAACAGTA	TATCAAATCA	TGATAAGAAG	ATTACAAAAG	850
CAAATGTGTC	AGAGTATTTT	AAAGATATAT	ATGAAACTTT	CGGGGAAAAC	900
GCTAAGGAAG	CAAAAAATTA	TTTAAAAGCA	GCAAGCAGGG	TTATAACTGC	950
TTTAAAATTG	ATAGAATTTT	TTAAAGATCA	AAAAAACGAA	AATGCACTTG	1000
CTATAAAAGA	AACATTTTTA	CCTTGCTATG	CCAAAAAAGC	TTTAATGATT	1050
AAAAAATTTA	AAAAAGATCC	TTTAAATTTA	AAGGAACAAT	TAGTTTTAAT	1100
TAAACCTTTT	ATTCAAACAA	AACTTCCTTA	TGATATTTGG	AAATTTTGGC	1150
AAAAAATAAA	AAATATTTAA				1170

SEQ ID NO: 16: Nucleotide sequence of β 1,4 GalNAc transferase-encoding ORF 5a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGCTATTTT	AATCATACTT	TGTGAAAATA	ATTTGCTTAT	TCATCCCTTT	50
TAGAAAAATT	AGACATAAAA	TAAAAAAAAC	ATTTTTACTA	AAAAACATAC	100
AACGAGATAA	AATCGATTCT	TATTTACCAA	AAAAAACTCT	TGTGCAAATT	150
AATAAATACA	ACAATGAAGA	TTTAATTAAA	CTTAATAAAG	CTATTATAGG	200
GGAGGGGCAT	AAAGGATATT	TTAATTATGA	TGAAAAATCT	AAAGATCCAA	250
AATCTCCTTT	GAATCCTTGG	GCTTTTATAC	GAGTAAAAAA	TGAAGCTATT	300
ACCTTAAAAG	CTTCTCTTGA	AAGCATATTG	CCTGCTATCC	AAAGAGGTGT	350
TATAGGATAT	AATGATTGTA	CCGATGGAAG	TGAAGAAATA	ATTCTAGAAT	400
TTTGCAAACA	ATATCCTTCA	TTTATACCAA	TAAATATATCC	TTATGAAATT	450
CAAATTCAAA	ACCCAAAATC	AGAAGAAAAT	AAACTCTATA	GCTATTATAA	500
TTATGTTGCA	AGTTTATAC	CAAAAGATGA	GTGGCTTATA	AAAATAGATG	550
TGGATCATAT	CTATGATGCT	AAAAAACTTT	ATAAAAGCTT	CTATATACCA	600
AAAAACAAAT	ATGATGTAGT	TAGTTATTCA	AGGGTTGATA	TTCATATTTT	650
TAATGATAAT	TTTTTCTTTT	GTAAAGATAA	TAATGGCAAT	ATATTGAAAG	700
AACCAGGAGA	TTGCTTGCTT	ATCAATAATT	ATAACTTAAA	ATGGAAAGAA	750
GTATTAATTG	ACAGAATCAA	TAACAATTGG	AAAAAAGCAA	CAAAACAAAG	800
TTTTTCTTCA	AATATACACT	CTTTAGAGCA	ATTAAAGTAT	AAACACAGGA	850
TATTATTTCA	CACTGAATTA	AATAATTATC	ATTTTCCTTT	TTTAAAAAAA	900
CATAGAGCTC	AAGATATTTA	TAAATATAAT	TGGATAAGTA	TTGAAGAATT	950
TAAAAAATTC	TATTTACAAA	ATATTAATCA	TAAAAATAGAA	CCTTCTATGA	1000
TTTCAAAAGA	AACTCTAAAA	AAAATATTCT	TAACATTGTT	TTAA	1044

SEQ ID NO: 17: Amino acid sequence of β 1,4 GalNAc transferase from *C. jejuni* strain OH4384 (encoded by ORF 5a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MLFQSYFVKI	ICLFIPFRKI	RHKIKKTFL	KNIQRDKIDS	YLPKKTLLVQI
51	NKYNNEGLIK	LNKAIIGEGH	KGYFNYDEKS	KDPKSPLNPW	AFIRVKNEAI
101	TLKASLESIL	PAIQRGVIGY	NDCTDGSEEI	ILEFCKQYPS	FIPIKYPYEI
151	QIQNPKSEEN	KLYSYNYVA	SFIPKDEWLI	KIDVDHIYDA	KKLYKSFYIP
201	KNKYDVVSYS	RVDIHYFNDN	FFLCKDNNGN	ILKEPGDCLL	INNYNLKWKE
251	VLIDRINNNW	KKATKQSFSS	NIHSLEQLKY	KHRILFHTEL	NNYHFPFLKK
301	HRAQDIYKYN	WISIEEFKKF	YLQNINHKE	PSMISKETLK	KIFLTLF

SEQ. ID NO: 18. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.

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ATGACTTTGT TTTATAAAAT TATAGCTTTT TTAAGATTGC TTAAAATTGA TAAAAAATTA
AAATTTGATA ATGAATATTT TTTAACTTAA AATAAAAAAA TCTACAATGA AAAGCATAAA
GGTTTTTTTG ATTTTGATCC AAACTCAAAA GATACAAAAT CTCCTTTAAA TCCATGGGCT
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTTGAAAG TATGTTACCT
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT
TTGGAATTTT GCAAACAATA CCCTTCGTTT ATACCAGTAA AATATCCCCA TGAGGTGCAA
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTCATAGTT ATTATAACTA TGTAGCTAGT
TTTATACCGC AAGATGAGTG GCTTATAAAA ATAGATGTGG ATCATTACTA TGATGCAAAA
AAATTATATA AGAGTTTTTA TATGGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT
AATTTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT
GGAGGGGATC AATTGTTAAT TCAAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTTCA
AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTC TGAACGCAA
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCTGCT
TTAAATATAT ATAGAAATGA TTATCAAAAA CATTGGATG CTTTAACTTT AGAAGATTTT
AAAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA
AAAGTAATTC GTGAAATATT AGATAAATTT AAATTGAGTG GTAAAAAAAT GACTTTAGCT
ATAATACCTG CTCGAGCTGG TTCAAAGGT ATAAAAAATA AAAATTTAGC TCTTTTGCAT
GATAGGCCTT TGTGTGATTA TACTATCAAT GCAGCAAAAA ATTCAAAGTA TGTAGATAAA
ATTGTTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTGTGATG
CATACCTTGA GTTTTTTATA AGATTATGAA AATATTGTTT TATTACAACC CACTTCTCCT
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTAAAAAT TTAAAAAATG AAACCTCAAAT
GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAAAATTTA AAGCTTTTAT AGATGATAAT
GGTAACCTAA AAGGAATTTG TGATAACAAA TATCCATTTA TGCCTAGACA AAAATTACCA
AAAACCTTATA TGAGTAATGG TGCAATTTAT ATAGTAAAGT CAAATTTAT TTTAAATAAC
CCAACTTTTC TACAAGAAAA AACAAGTTGC TATATAATGG ACGAAAAAGC TAGTTTGGAT
ATAGATACAA CAGAGGATTT AAAAAGAGTT AATAATATAA GCTTCTTA

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SEQ. ID NO: 19. Amino Acid sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.

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MTLFYKIIAF LRLKIDKKL KFDNEYFLNL NKKIYNEKHK GFFDFDPNSK DTKSPLNPW
AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE
VQIENPQSEE NKLHSYYNYV ASFIPQDEWL IKIDVDHYD AKKLYKSFYM ASKNTAVRF
PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNVFIER MVSQSQWID PEKTVKELY
SEQIIPKHI KILQAELLQW HFPALKYHRN DYQKHLDAIT LEDFKKIHYR HRKIKKINY
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAAKN
SKYVDKIVLS SDGDDILEYG QTQGVVDLKR PKELALDDTT SDKVVLHTLS FYKDYENIV
LLQPTSPLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDNNGNL KGICDNKYP
FMPRQKLPKT YMSGAIYIV KSNLFLNNPT FLQEKTSYI MDEKASLDID TTEDLKRNNI SFL

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SEQ. ID NO: 20. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:10.

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ATGCTATTTT AATCATACTT TGTGAAAATA ATTGCTTAT TCATCCCTTT TAGAAAAATT
AGACATAAAA TAAAAAAAAC ATTTTACTA AAAACATAC AACGAGATAA AATCGATTCT
TATCTACCAA AAAAAACTCT TATACAAAT AATAAATACA ACAATGAAGA TTTAATTAAA
CTTAATAAAG CTATTATAGG GGGGGGGCAT AAAGGATATT TTAATTATGA TGAAAAATCT
AAAGATCCAA AATCTCCTTT GAATCCTTGG GCTTTTATAC GAGTAAAAAA TGAAGCTATT
ACCTTAAAAG CTTCTCTTGA AAGCATATTG CCTGCTATT CAAAGAGGTG TATAGGATAT
AATGATTGCA CCGATGGAAG TGAAGAAATA ATTCTAGAAT TTTGCAAACA ATATCCTTCA
TTTATACCAA TAAATATCC TTATGAAAT CAAATTCAAA ACCCAAATC AGAAGAAAAAT
AAACTCTATA GCTATTATAA TTATGTTGCA AGTTTTATAC CAAAAGATGA GTGGCTCATA
AAAATAGATG TGGATCATTA TTATGATGCA AAAAAATTAT ATAAGAGTTT TTATATACCT
AGAAAAAATT ATCATGTAAT TAGTTACTCT AGGATAGATT TTATATTTAA TGAAGAAAAA
TTTTATGTTT ATCGGAATAA GGAGGGGGAG ATTTTAAAAG CTCCTGGAGA TTGTTTAGCA
ATACAAAACA CTAACCTATT TTGGAAGAA ATACTTATTG AAGATGATAC ATTTAAGTGG
AATACTGCAA AAAATAATAT AGAGAATGCA AAATCATATG AAATTTTAAA AGTTAGAAAT
AGAATTTATT TTACTACAGA ACTTAATAAT TATCATTTTC CATTTATAAA AAATTATAGA
AAAAATGATT ATAAGCAGTT AAATTGGGTT AGCTTAGATG ATTTTATTAA AAATTATAAA
GAAAAATTAA AAAATCAAAT AGATTTTAAA ATGCTAGAAT ACAAACATT AAAAAAAGTG
TACAAAAAGC TTACATCTTC AGCAAGCGAT AAAATT

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SEQ. ID NO: 21. Amino acid sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.

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MLFQSYFVKI ICLFIPFRKI RHKIKKTFLI KNIQRDKIDS YLPKKTLLIQI NKYNNEDLI
KLNKAIIGGG HKGYFNYDEK SKDPKSPLNP WAFIRVKNEA ITLKASLESI LPAIQRGVI
GYNDCTDGSE EIILEFCKQY PSFIPIKYPY EIQIQNPKSE ENKLYSYNY VASFIPKDE
WLKIDVDHY YDAKKLYKSF YIPRKNYHVI SYSRIDFIFN EEKFYVYRNK EGEILKAPG
DCLAIQNTNL FWKEILIEDD TFKWNTAKNN IENAKSYEIL KVRNRIYFTT ELNNYHFPF
IKNYRKNDYK QLNWVSLDDF IKNYKEKLN QIDFKMLEYK TLKKVYKLT SSASDKI
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**SEQ. ID NO: 22. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.
O:36**

DNA:

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ATGCTTAAAA AAATCATTTT TTTATATAAA AGATACTCGA TTTCTAAAAA ATTGGTTTTA
GATAATGAGC ATTTTCATTAA GGAAAAATAA AACATCTATG GAAAAAACA TAAGGGCTTT
TTTGACTTTG ATGAAAAGGC TAAGGATGTG AAATCACCCC TTAATCCTTG GGGATTTATC
AGGGTTAAAA ATGAAGCTTT AACCCCTAAGA GTTTCTTTAG AAAGTATACT ACCTGCTTTA
CAAAGAGGAA TTATAGCTTA CAACGACTGT GATGATGGGA GTGAAGAGCT TATTTTAGAA
TTTTGCAAGC AATATCCCAA CTTTCATTGCT AAAAAATATC CTTATAAAGT AGATCTAGAA
AATCCTAAAA ATGAAGAAAA TAAACTTTAC TCTTATTACA ATTGGGCAGC ATCTTTTATA
CCCTTAGATG AGTGGTTTAT AAAAATCGAT GTGGATCATT ACTACGATGC CAAGAAGCTT
TATAAGAGTT TTTATAGGAT TGATCAAGAA AATAAAGCCT TATGCTACCC AAGAATTAAT
TTTATAATCT TAAATGGAAA TATTTATGTG CAAAAATAGT GAAATTATGG ATTCATAGGG
GGGGGGGATC AACTCTTGAT TAAAAGAAGA AATAGTAGCT TTATAGAAAG AAGGGTTTCA A
AAAAAAGCCA ATGGATAGAT CCTAAGGGAC TTATAGAAGA ACTCTACTCC GAGCAACAAG
TCTTATCTCA AGGAGTGAAA ATACTACAAG CTCCCCTACT TCAGTGGCAT TTTCTGCCT
TAAAATACCG CCGAAACGAT TACCAACAAT ATTTAGATAT CTTGAGTTTA GAAGAATTTT
AGGCCTTTCA TCGTAAGAGC AAAGAGGCTA AAAAAATAGA CTTTGCCATG CTA AACGCC
CTGTAATCGA GCAATATTA AAGAAATTTC AAGGAGAGAT AAAA
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SEQ. ID NO: 23. Amino acid sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:36.

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MLKKIISLYK RYSISKKLVL DNEHFIKEN NIYGKKHKGF FDFDEKAKDV
KSPLNPWGFI RVKNEALTLR VSLESILPAL QRGIIAYNDC DDGSEELILE
FCKQYPNFIA KKYPYKVDLE NPKNEENKLY SYYNWAASFI PLDEWFIKID
VDHYYDAKKL YKSFYRIDQE NKALCYPRIN FIILNGNIYV QNSGNYGFIG
GGDQLLIKRR NSSFIERRVS KKSQWIDPKG LIEELYSEQQ VLSQGVKILQ
APLLQWHFPA LKYRRNDYQQ YLDILSLEEF QAFHRKSKEA KKIDFAMLR
PVIEQILKKF QGEIK
```

SEQ. ID NO: 24. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* NCTC11168

```
ATGACTTTGT TTTATAAAAT TATAGCTTTT TTAAGATTGC TTAAAATTGA TAAAAAATTA
AAATTTGATA ATGAATATTT TTAAACTTTA AATAAAAAAA TCTACGATGA AAAGCATAAA
GGTTTTTTTG ATTTTGATCC AAACCTCAAAA GATACAAAAT CTCCTTTAAA TCCATGGGCT
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTTGAAAG TATGTTACCT
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT
TTGGAATTTT GCAAACAATA CCCTTCGTTT ATACCAGTAA AATATCCCCA TGAGGTGCAA
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTTCATAGT ATTATAACTA TGTAGCTAGT
TTTATACCGC AAGATGAGTG GCTTATAAAA ATAGATGTGG ATCATTACTA TGATGCAAAA
AAATTATATA AGAGTTTTTA TATGGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT
AATTTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT
GGAGGGGATC AATTGTTAAT TCAAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTTCA
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AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTG TGAACAGCAA
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCCTGCT
TTAAATATAT ATAGAAATGA TTATCAAAAA CATTGGATG CTTTAACTTT AGAAGATTTT
AAAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAAATA ATTATACAAT GCTTGATGAA
AAAGTAATTC GTGAAATATT AGATAAATTT AAATTGAGTG GTAAAAAAT GACTTTAGCT
ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAATA AAAATTTAGC TCTTTTGCAT
GATAGGCCTT TGTTGTATTA TACTATCAAT GCAGCAAAAA ATTCAAAGTA TGTAGATAAA
ATTGTTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTGTATTG
CATACCTTGA GTTTTTATAA AGATTATGAA AATATTGTTT TATTACAACC CACTTCTCCT
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTAAAAAT TAAAAATGA AAACCTCAAT
GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAATTTTAA AAGCTTTTAT AGATGATAAT
GGTAACTTAA AAGGAATTTG TGATAACAAA TATCCATTTA TGCCTAGACA AAAATTACCA
AAACTTTATA TGAGTAATGG TGCAATTTAT ATAGTAAAGT CAAATTTATT TTTAAATAAC
CCAACCTTTC TACAAGAAAA AACAAGTTGC TATATAATGG ACGAAAAAGC TAGTTTGGAT
ATAGATACAA CAGAGGATTT AAAAAAGAGT AATAATATAA GCTTCTTA

```

SEQ. ID NO: 25. Amino Acid sequence of β -1,4-GalNAc transferase from *C. jejuni* NCTC11168

```

MTLFYKIIAF LRLKIDKKL KFDNEYFLNL NKKIYDEKHK GFFDFDPNSK DTKSPLNPW
AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE
VQIENPQSEE NKLHSYNYV ASFIPQDEWL IKIDVDHYD AKKLYKSFYM ASKNTAVRF
PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNSVFIER MVSKQSQWID PEKTVKELY
SEQQIIPKHI KILQAELLQW HFPALKYHRN DYQKHLALT LEDFKKIHyr HRKIKKINY
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAANK
SKYVDKIVLS SDGDDILEYG QTQGVLDLKR PKELALDDTT SDKVVLHTLS FYKDYENIV
LLQPTSPLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP
FMPRQKLPKT YMSNGAIYIV KSNLFLNNPT FLQEKTSYI MDEKASLDID TTEDLKRVNN ISFL

```

SEQ ID NO: 26: Nucleotide sequence of β 1,3-galactosyltransferase-encoding ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384.

```

ATGTTTAAAA TTTCAATCAT CTTACCAACT TATAATGTGG AACAAATATAT 50
AGCAAGGGCA ATAGAAAGCT GTATCAATCA GACTTTTAAA GATATAGAAA 100
TAATTGTAGT TGATGATTGT GGAAATGATA ATAGTATAAA TATAGCCAAA 150
GAATACTCTA AAAAAGACAA AAGAATAAAA ATAATCCACA ATGAAAAAAA 200
CTTAGGTCTT TTAAGAGCAA GATATGAAGG TGTGAAAGTA GCAAACCTCTC 250
CTTATATAAT GTTTTTAGAT CCTGATGATT ATTTGGAAC TAAATGCTTGT 300
GAAGAGTGTA TAAAAATTTT AGATGAACAG GATGAAGTTG ATTTAGTGTT 350
TTTCAATGCT ATTGTTGAAA GTAATGTTAT TTCATATAAA AAGTTTGACT 400
TTAATTCTGG TTTTATAGC AAAAAAGAGT TTGTAAAAAA AATTATTGCA 450
AAGAAAAATT TATATTGGAC TATGTGGGGG AAACCTATAA GAAAGAAATT 500
GTATTTAGAA GCTTTTGCGA GTTTAAGACT CGAGAAAGAT GTTAAATCA 550
ATATGGCTGA AGATGTATTG TTATATTATC CAATGTTAAG TCAAGCTCAA 600
AAAATAGCAT ATATGAACG TAATTTATAT CATTACGTGC CTAATAATAA 650
TTCAATTTGT AATACTAAGA ATGAAGTGCT TGTTAAAAAT AATATTCAAG 700
AGTTGCAGTT GGTTTAAAC TATTTAAGGC AAAATTATAT TTAAACAAG 750
TATTGTAGCG TTCTCTATGT GCTAATTAAA TATTTGCTAT ATATTCAAAT 800
ATATAAAATA AAAAGAACAA AATTAATGGT TACATTATTA GCTAAAATAA 850
ATATTTTAAAC TTTAAAAATT TTATTTAAAT ATAAAAAATT TTTAAACAA 900
TGTTAA 906

```

SEQ ID NO: 27 Amino acid sequence of β 1,3-galactosyltransferase encoded by ORF 6a of
LOS biosynthesis locus from *C. jejuni* strain OH4384

	10	20	30	40	50
1	MFKISIIILPT	YNVEQYIARA	IESCINQTFK	DIEIIVVDDC	GNDNSINIAK
51	EYSKKDKRIK	IIHNEKNLGL	LRARYEGVKV	ANSPYIMFLD	PDDYLELNAC
101	EECIKILDEQ	DEVDLVFFNA	IVESNVISYK	KFDFNSGFYS	KKEFVKKI IA
151	KKNLYWTMWG	KLIRKKLYLE	AFASLRLEKD	VKINMAEDVL	LYYPMLSQAQ
201	KIAYMNCNLY	HYVPNNNSIC	NTKNEVLVKN	NIQELQLVLN	YLRQNYILNK
251	YCSVLYVLIK	YLLYIQIYKI	KRTKLMVTLL	AKINILTLLKI	LFKYKKFLKQ
301	C				

SEQ ID NO: 28. Nucleotide sequence of CgtB β 1,3 galactosyltransferase from *C. jejuni*
serotype O:2 (strain NCTC 11168).

ATGAGTCAAA	TTTCCATCAT	ACTACCAACT	TATAATGTGG	AAAAATATAT	50
TGCTAGAGCA	TTAGAAAGTT	GCATTAACCA	AACTTTTAAA	GATATAGAAA	100
TCATTGTAGT	AGATGATTGT	GGTAATGATA	AAAGTATAGA	TATAGCTAAA	150
GAGTATGCTA	GTAAAGATGA	TAGAATAAAA	ATCATAACATA	ATGAAGAGAA	200
TTTAAAGCTT	TTAAGAGCAA	GATATGAAGG	TGCTAAAGTA	GCAACTTCAC	250
CTTATATCAT	GTTTTTAGAT	TCTGATGATT	ATTTAGAACT	TAATGCTTGC	300
GAAGAATGTA	TTAAAATTTT	GGATATGGGT	GGGGGGGGTA	AAATTGATTT	350
GTTGTGTTTT	GAAGCTTTTA	TTACCAATGC	AAAAAAATCA	ATAAAAAAAT	400
TAAATATAAA	ACAAGGAAAA	TACAACAACA	AAGAATTTAC	AATGCAAATA	450
CTTAAACTA	AAAATCCATT	TTGGACAATG	TGGGCTAAAA	TAATCAAAAA	500
AGATATTTAT	TTAAAAGCCT	TCAACATGTT	AAATCTCAAA	AAAGAAATCA	550
AAATAAATAT	GGCAGAAGAT	GCCTTATTAT	ATTATCCTTT	GACAATATTA	600
TCTAATGAAA	TATTTTACTT	AACACAACCT	TTGTATACCC	AGCATGTAAA	650
TAGCAATTCT	ATAACAAATA	ATATTAATTC	TTTAGAAGCT	AATATTCAAG	700
AACATAAAAT	TGTTTTAAAT	GTTTTAAAAT	CAATTAAAAA	TAAAAAAACA	750
CCTCTATATT	TTCTAATTAT	ATATTTATTA	AAAATTCAAT	TATTGAAATA	800
TGAACAAAAT	TTTAATAAAA	GAAATATAAA	TCTTATTTAT	TATAAAATAA	850
ATATTTTATA	TCAAAAATAT	CAATTCAAAT	GGAAAAAATT	TTTATATAAT	900
TTAATTCCGT	AA				912

SEQ ID NO: 29. Amino acid sequence of CgtB β 1,3 galactosyltransferase from *C. jejuni*
serotype O:2 (strain NCTC 11168).

	10	20	30	40	50
1	MSQISIIILPT	YNVEKYIARA	LESCINQTFK	DIEIIVVDDC	GNDKSIDI AK
51	EYASKDDRIK	IIHNEENLKL	LRARYEGAKV	ATSPYIMFLD	SDDYLELNAC
101	EECIKILD MG	GGGKIDLLCF	EAFITNAKKS	IKKLNIKQ GK	YNNKEFTMQL
151	KTKNPFWT MW	AKIIKKDIYL	KAFNMLNLKK	EIKINMAEDA	LLYYPLTILS
201	NEIFYLTQPL	YTQHVNSNSI	TNNINSLEAN	IQEHKIVLNV	LKSIKNKKTP
251	LYFLIIYLLK	IQLLKYEQNF	NKRNINLIYY	KINILYQKYQ	FKWKKFLYNL
301	IP				

SEQ ID NO. 30: Nucleotide sequence of β -1,3-galactosyl transferase from *C. jejuni* O:10

```

ATGTTTAAAA TTTCAATCAT CTTGCCAACT TATAATGTGG AACAATATAT AGCAAGGGCA
ATAGAAAGTT GTATCAATCA GACTTTTAAA AATATAGAAA TAATTGTAGT TGATGATTGT
GGAAGTGACA AAAGTATAGA TATAGTTAAA GAATATGCCA AAAAAGATGA TAGAATAAAA
ATCATAACATA ATGAAGAAAA TTTAAACTTT TTAAGAGCTA GATATGAAGG TGTAAGAGTA
GCAAACCTCTC CTTATATAAT GTTTTTAGAT CCTGATGATT ATTTAGAACT TAATGCTTGT
GAAGAATGTA TGAAAAATTTT AAAAAACAAT GAAATAGATT TATTATTTT TAATGCATT
GTATTGGAAA ATAACAATAA AATAGAAAAGA AAGTTGAATT TTCAAGAAAA ATGTTATGTA
AAAAAAGATT TTTTAAAAAGA ACTATTAAAA ACTAAAAATT TATTTTGGAC AGTGTGGGCA
AAAGTCATAA AAAAAGAATT ATATCTCAAG GCTGTTGGTT TAATATCGCT AGAAAATGCT
AAAATAAATA TGGCTGAAGA TGTTTTATTA TATTACCCTT TGATAAATAT TTCAAATACT
ATATTTTCACT TGAGTAAAAA TTTATACAAT TATCAAATAA ATAATTTCTC TATAACCAAA
ACATTAAACAT TGCAAAATAT AAAAAACAAT ATACAAGAAC AAGATAATGT TCTATATCTT
CTAAGAAGA TGCAATATAA TTACAATTTT AACTTAACTT TGCTTAAATT AATTGAGTAT
TTTTTATTAA TTGAAAAATA CTCATTATCA AGCAAGCGAA ATGTTCTTTG TTTTAAAAATC
AATATTTTTT TTAAAAAAT CCAATTTAAA TTTTATCGCT TGCTGAAGAT G

```

SEQ ID NO. 31: Amino acid sequence of β -1,3-galactosyl transferase from *C. jejuni* O:10

```

MFKISIIILPT YNVEQYIARA IESCINQTFK NIEIIVDDC GSDKSIDIVK EYAKKDDRI
KIIHNEENLK LLRARYEGVK VANSPIYIMFL DPDDYLELNA CEECMKILKN NEIDLFFFN
AFVLENNNKI ERKLNFOEKC YVKKDFLKL LKTKNLFWTV WAKVIKKELY LKAVGLISL
ENAKINMAED VLLYYPLINI SNTIFHLSKN LYNQINNF S ITKTLTLQNI KTNIQEQDN
VLYLLKKMQY NYNFNLTLLK LIEYFLLIEK YSLSSKRNVL CFKINIFFKK IQKFYRLLK M

```

SEQ ID NO: 32. Amino acid sequence of lipid A biosynthesis acyltransferase (*C. jejuni* OH4384).

```

1 MKNSDRIYLS LYYILKFFVT FMPDCILHFL ALIVARIAFH LNKKHRKIIN
51 TNLQICFPQY TQKERDKLSL KIYENFAQFG IDCLQNQNTT KEKILNKVNF
101 INENFLIDAL ALKRPIIFTT AHYGNWEILS LAYAAYGAI SIVGKKLKSE
151 VMYEILSQSR TQFDIELIDK KGGIRQMLSA LKKERALGIL TDQDCVENES
201 VRLKFFNKEV NYQMGASLIA QRSNALIIPV YAYKEGGKFC IEFFKAKDSQ
251 NASLEELTLY QAQSCEEMIK KRPWEYFFFH RRFASYNEEI YKGAK

```

SEQ ID NO: 33. Amino acid sequence of glycosyltransferase encoded by ORF 3a of *C. jejuni* OH4384 *LOS* locus.

```

1 MNLKQISVII IVKNAEQTLL ECLNSLKDFD EIILLNNESS DNTLKIANEF
51 KKDFANLYIY HNAFIGFGAL KNLALSIAKN DWILSIDADE VLENECIKEL
101 KNLKLQEDNI IALSRLNLYK GEWIKACGWW PDYVLRIFNK NFTRFNDNLV
151 HESLVLPSNA KKIYLNKGLK HYSYKDISHL IDKMQYYSSL WAKQNIHKKS
201 GVLKANLRAF WTFFRNYFLK NGFLYGYKGF IISVCSALGT FFKYMKLYEL
251 QRQKPKTCAL IIITYNQKER LKLVLDSVKN LAFLPNEVLI ADDGSKEDTA
301 RLIEEYQKDF PCPLKHIWQE DEGFKLKSKR NKTIKNADSE YIIVIDGDMI
351 LEKDFIKEHL EFAQRKLFLQ GSRVILNKKE SEEILNKDDY RIIFNKKDFK
401 SSKNSFLAKI FYSLSKKR

```

SEQ ID NO: 34. Amino acid sequence of glycosyltransferase encoded by ORF 4a of *C. jejuni* OH4384 *LOS* locus.

```

1 MKKIGVVIPI YNVEKYLREC LDSVINQTYT NLEIILVNDG STDEHSLNIA
51 KEYTLKDKRI TLFDKKNGGL SSARNIGIEY FSGEYKLKNK TQHIKENS LI
101 EFQLDGNPNY NIYKAYKSSQ AFNNEKDLTN FTYPSIDYII FLDS DNYWKL
151 NCIEECVIRM KNVDVLWFDH DCTYEDNIKN KHKKTRMEIF DFKKECIITP
201 KEYANRALSV GSRDISFGWN GMIDFNFLKQ IKLKFINFII NEDIHFGIIL
251 FASANKIYVL SQKLYLCRLR ANSISNHDKK ITKANVSEYF KDIYETFGEN
301 AKEAKNYLKA ASRVITALKL IEFKDKQKNE NALAIKETFL PCYAKKALMI
351 KKFKKDPLNL KEQLVLIKPF IQTKLPYDIW KFWQKIKNI

```

SEQ ID NO: 35. Amino acid sequence of sialic acid synthase encoded by ORF 8a of *C. jejuni* OH4384 *LOS* locus.

```

1 MKEIKIQNII ISEEKAPLVV PEIGINHNG SLELAKIMVD AAFSTGAKII
51 KHQTHIVEDE MSKAAKKVIP GNAKISIEYI MQKCALDYKD ELALKEYTEK
101 LGLVYLSTPF SRAGANRLED MGVSAFKIGS GECNNYPLIK HIAAFKKPMI
151 VSTGMNSIES IKPTVKILLD NEIPFVLMHT TNLYPTPHNL VRLNAMLELK
201 KEFSCMVGLS DHTTDNLACL GAVALGACVL ERHFTDSMHR SGPDIVCSMD
251 TQALKELIIQ SEQMAIMRGN NESKKAQKE QVTIDFAFAS VVSIKDIKKG
301 EVLSMDNIWV KRPGGGISA AEFENILGKK ALRDIENDTQ LSYEDFA

```

SEQ ID NO: 36. Amino acid sequence of enzyme involved in sialic acid biosynthesis encoded by ORF 9a of *C. jejuni* OH4384 *LOS* locus.

```

1 MYRVQNSSEF ELYIFATGMH LSKNFGYTVK ELYKNGFKNI YEFINYDKYF
51 STDKALATTI DGFSRYVNEL KPDLIVVHGD RIEPLAAAI V GALNNILVAH
101 IEGGEISGTI DDSLRHAISK LAHIHLVNDE FAKRRLMQLG EDEKSIFIIG
151 SPDLELLNDN KISLNEAKKY YDINYENYAL LMFHPVTTEI TSIKNQADNL
201 VKALIQSNKN YIVIYPNNDL GFELILQSYE ELKNNPRFKL FPSLRFEYFI
251 TLLKNADFII GNSSCILKEA LYLKTAGILV GSRQNGRLGN ENTLKVNANS
301 DEILKAINTI HKKQDLFSK LEILDSSKLF FEYLOSSEFF KLNTQKVFKD
351 IK

```

SEQ ID NO: 37. Amino acid sequence of CMP-sialic acid synthetase encoded by ORF 10a of *C. jejuni* OH4384 *LOS* locus.

```

1 MSLAIIPARG GSKGIKNKNL VLLNNKPLIY YTIKAALNTK SISKVVVSSD
51 SDEILNYAKS QNVDILKRPI SLAQDNTTSD KVLLHALKFY KDYEDVVFLQ
101 PTSPLRTNIH IDEAFNLYKN SNANALISVS ECDNKILKAF VCNEYGDLAG
151 ICNDEYPFMP RQKLPKTYMS NGAIYILKIK EFLNNPSFLQ SKTKHFLMDE
201 SSSLDIDCLE DLKKAQEIWK K

```

SEQ ID NO: 38. Amino acid sequence of acetyltransferase encoded by ORF 11a of *C. jejuni* OH4384 *LOS* locus.

```

1 MEKITLKC NK NILNLLKQYN IYTKTYIENP RRFSRLKTKD FITFPLENNQ
51 LESVAGLGIE EYCAFKFSNI LHEMDSFSFS GSFLPHYTKV GRYCSISDGV

```

```

101 SMFNFQHPMD RISTASFTYE TNHSFINDAC QNHINKTFPI VNHNPSSSIT
151 HLIIQDDVWI GKDVLLKQGI TLGTGCVIGQ RAVVTKDVPV YAIVAGIPAK
201 IIKYRFDEKT IERLLKIQWW KYHFADFYDI DLNLKINQYL DLLEEKIIKK
251 SISYYNPKNL YFRDILELKS KKIFNLF

```

SEQ ID NO: 39. Amino acid sequence of glycosyltransferase encoded by ORF 12a of *C. jejuni* OH4384 *LOS* locus.

```

  1 MPQLSIIIPL FNSCDFISRA LQSCINQTLK DIEILIIDDK SKDNSLNMVL
 51 EFAKDPRIK IFQNEENLGT FASRNLGVLH SSSDFIMFLD SDDFLTPDAC
101 EIAFKEMKKG FDLCLFADFV HRVTKQFYR FKQDEVFNQK EFLEFLSKQR
151 HFCWSVWAKC FKKDIILKSF EKI KIDERLN YGEDVLFCYI YFMFCEKIAV
201 FKTCIYHYEF NPNGRYENKN KEILNQNYHD KKKSNEIIKK LSKEFAHDEF
251 HQKLFVVLKR EEAGVKNRLK

```